

Monitoring the State of the St. Lawrence River

WATER

SEDIMENTS

SHORELINES

BIOLOGICAL RESOURCES

USES

2nd edition

NORTHERN GANNET

A Sentinel Species for the Gulf

Background

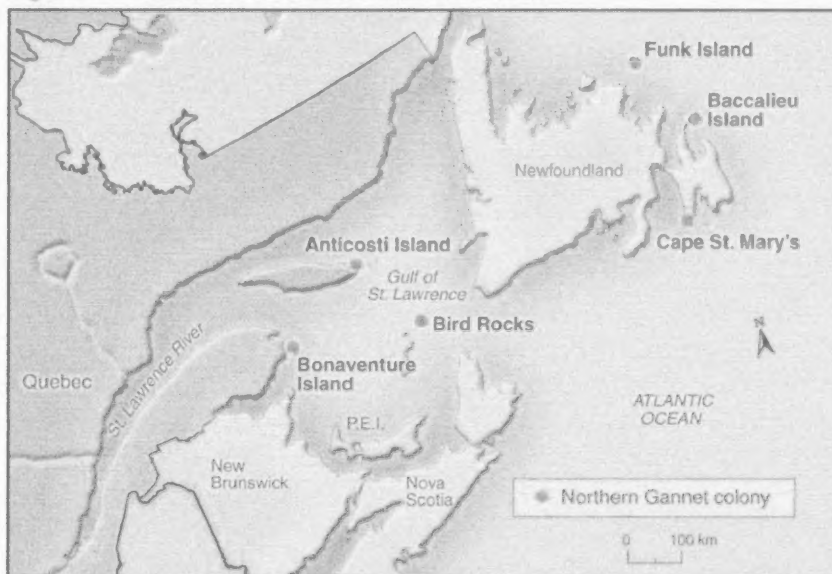
The Northern Gannet is a seabird whose expansive feeding grounds and a diet rich in fish can provide information on the abundance of its prey and the degree of contamination of the

ecosystem. That's why it was chosen as a sentinel species (or "bioindicator") of the state of the Gulf of St. Lawrence. This bird can sometimes travel over 200 km in search of mackerel, herring, capelin and sand lance. There are six Northern



Photo: Jean-François Gail, Canadian Wildlife Service

Figure 1. Location of Northern Gannet colonies



Gannet colonies in eastern North America, including three along the east coast of Newfoundland and three others in the Quebec portion of the Gulf of St. Lawrence (Figure 1). The populations of the eastern tip of Anticosti Island, Bird Rocks in the Magdalen Islands and Bonaventure Island together make up 75% of the North American population.

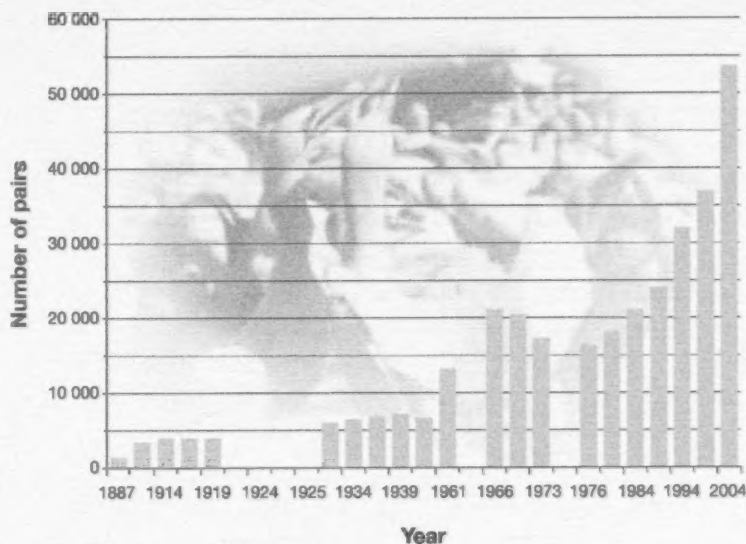
The Bonaventure Island population of Northern Gannet grew by about 3% annually from the turn of the century until the mid-1960s, when its numbers fell by almost 25% in ten years, at the same time that the Newfoundland colonies were remaining stable. Scientists discovered that high concentrations of residual organochlorine substances detected in gannet eggs, including dieldrin and DDT, were responsible for the low reproductive rate observed during

this period. At high concentrations, these toxic substances interfere with the synthesis of calcium carbonate, the main component of eggshells; thin eggshells are even more vulnerable to impact. This reproductive problem, combined with the fact that the species produces only one egg per clutch, led to a spectacular drop in hatching success rates and the consequent reduction, equally dramatic, in the number of breeding adults. Large-scale spraying of DDT in the 1960s to control insect infestations in New Brunswick and the Gaspé region largely explains the high concentrations detected in some species in the Gulf of St. Lawrence.

Overview of the Situation

The population growth of Bonaventure Island gannets remained relatively steady between 1887 and 1966, when the number of pairs grew from 1500 to 21 215. It was only in 1984 that numbers returned to near-1966 levels, after having reached a low of 16 400 pairs in 1976 (Figure 2). The colony has continued

Figure 2. The Bonaventure Island gannet population since the turn of the century



to grow ever since, expanding from 24 125 pairs in 1989 to a population of 53 635 pairs in 2004.

Figure 3 (A and B) provides a good indication of reductions in DDT concentrations in eggs, expressed here as a percentage relative to the 1968 level, which coincides with the sudden jump in the net productivity rate and in the

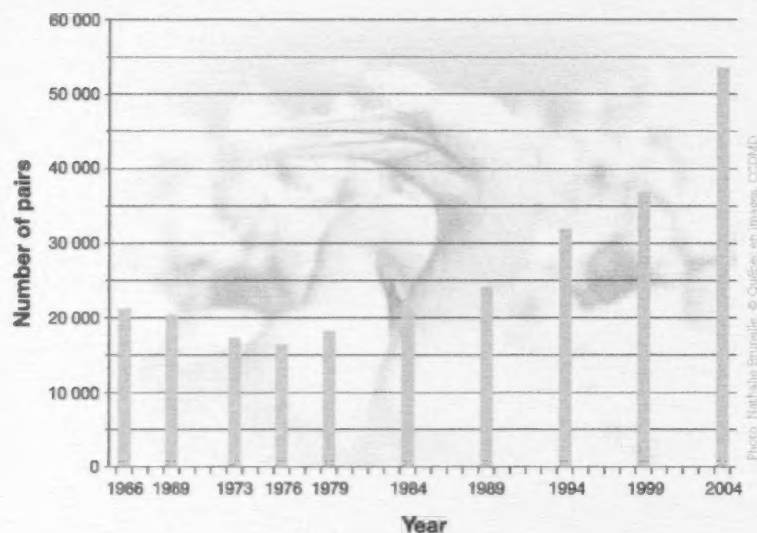


number of pairs, after a 5- to 7-year lag (corresponding with gannet breeding age). With the reproductive success rate remaining above 67%, the population continues to grow. Unless the gannets

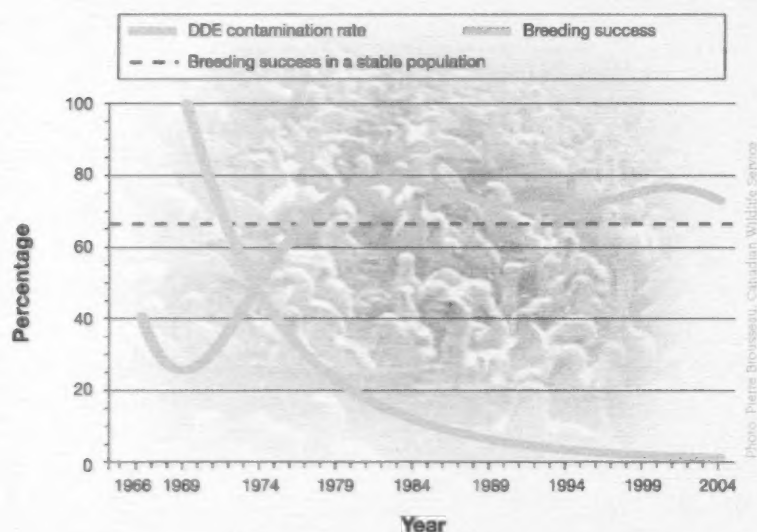
colonize new sites, however, scientists are of the opinion that population growth will stabilize within the next few years, when they will have occupied almost all the available habitat.

Figure 3. Population, DDE contamination rate in eggs and breeding success of Bonaventure Island gannets from 1966 to 2004

A. Population trends



B. Relationship between DDE contamination rate in gannet eggs and breeding success



KEY VARIABLES

A net reproductive rate (or breeding success, expressed as the percentage of fledglings relative to the number of eggs laid) of greater than 67% and the maintenance or growth of the population indicate that the Gulf of St. Lawrence Northern Gannet is thriving.

Outlook

By monitoring the number of nesting pairs, hatching success and reproductive success rates, as well as observing nesting habitat, scientists can readily determine the state of health of a population and identify the pressures that may be acting on its dynamics. The pursuit of the five-year monitoring



Photo: Nathalie Brunelle. © Québec en Images. CC-BY-NC

plan will provide timely information on changes affecting the structure or abundance of the gannet population, in order to then identify which pressures are being brought to bear on the species, whether in the St. Lawrence system or in its wintering grounds in the Gulf of Mexico.

To Know More

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State of the St. Lawrence Monitoring Program

Six government partners — Environment Canada, Fisheries and Oceans Canada, the Canadian Space Agency, Parks Canada Agency, the Ministère du Développement durable, de l'Environnement et des Parcs du Québec, the Ministère des Ressources naturelles et de la Faune du Québec — and Stratégies Saint-Laurent, a nongovernmental organization that works actively with riverside communities, are pooling their expertise and efforts to provide Canadians with information on

the state of the St. Lawrence and long-term trends affecting it.

To this end, environmental indicators have been developed on the basis of data collected as part of each organization's ongoing environmental monitoring activities. These activities cover the main components of the environment, namely water, sediments, biological resources, uses and shorelines.

For more information on the State of the St. Lawrence Monitoring Program, please visit our Web site at www.planstlaurent.qc.ca or contact our offices at the following address:

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